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The T-Rex Skull

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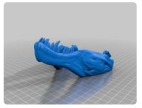

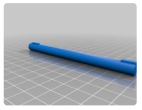

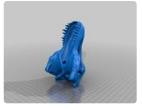

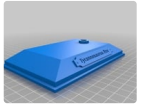

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Summary

The T-Rex Skull from MakerBot Academy comes complete with a lesson plan that explores characteristics of the most-studied dinosaur, *Tyrannosaurus Rex*.

With this 3D printable model, students will understand what can be learned from fossils and in doing so, acknowledge the difference between scientific facts and theories.

Download and print the entire T-Rex Skeleton.

Standards

NGSS CCSS

Overview and Background

Overview
No matter how lengthy its name, many children can name a dinosaur on sight. This lesson goes beyond naming dinosaurs and will give students a broader understanding of how we know about dinosaurs.

In the first part of the lesson, students will discuss what they know about lions. Then they will do the same for a *Tyrannosaurus Rex*. While the comparison is a stretch, it demonstrates what we know as fact and what we know as theory.

As students discuss the T. rex, they will learn that fossils tell a story about the animal. They describe facts (how tall, how wide, what kind of teeth) and ideas (what the T. rex might have eaten, how fast it may have moved due to its leg structure, or how it may have hunted).

The other part of the lesson covers how fossils are formed. The purpose is to identify conditions necessary for fossilization. Because students will go over this information in the first part of the lesson, this exercise allows them to construct their own storyboard imagining the circumstances for another animal to become fossilized.

Learning Objectives
Students will understand what can be learned from fossils and know the difference between facts and theories. They will also gain a general understanding of how fossils are formed.

Lesson Plan and Activity

The T. rex Skull
Understanding fossils: An introduction to paleontology

Day 1: Introduction
List facts about the lion and other living animals. List things on the board, such as: size, speed, diet, teeth, mane, tail, etc.

Ask students, *What would we know about this animal if it were extinct?* Discuss that only the hard parts (bones and teeth) are preserved as fossils. Then ask students to choose those things listed on the board that indicate what we would know about the lion if all we had were fossilized bones and teeth. Circle appropriate things on the board that are listed, then make a list of guesses.

Ask students what do we know about fossilized animals. Pass around the MakerBot T. rex Skull and photos of the dinosaur, and invite the students to interpret it with both facts and guesses.

Have the class draw muscles and skin on the T. rex. Discuss how imagination comes into the interpretation of fossils.

You will have discussed fossilization with your students when doing the activity. Now, emphasize the discussions and the activity. On the board, make two columns. Title one, *What we know about dinosaurs*. The other should be titled, *What we have to guess*.

Then pose these questions:
* How do we know what we know about dinosaurs? (review what was just discussed about lions and the T. rex: that bones can tell the size of the animal, its running ability, what kind of teeth it had).
* What are things that we have to guess about? (While fossils may tell exactly what kind of teeth an animal has, we have to guess about what it might have eaten).
* Mention colorings of the T. rex. Point out that we must guess dinosaur colors because fossils do not tell us what color they were.

The most famous dinosaur fossil of our time is Sue, the T. rex displayed at the Field Museum in Chicago, Illinois. While your students may already know about Sue, this will get your students excited about the lesson.

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* What do we know about Sue? (Statistics, skull size, number of bones, where it was discovered, etc) List responses on the board.
* How do we know all of these things? (Students will likely answer bones or fossils)
* What is the significance of finding Sue? (It is the most complete T. rex skeleton ever).
* How do we know this? (Students should know that this is apparent through prior knowledge of other fossils and a comparison of Sue to other T. rex fossils

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The following questions will help you gauge what students know about fossils in general before starting the lesson.

* What is a fossil? (Many students will answer bones, which is fine, but ask them if things like dinosaur eggs, or even nests, are considered fossils. Trace fossils include eggs, nests, tracks, and impressions.
* How do fossils form? (Though students may be very familiar with dinosaurs, they may not know the process that preserves the bones. If students cannot answer the question, that is fine. They will learn in this lesson.
* What can fossils tell us? (Here, you can lead the students. Remind them of all the things we know about Sue).

Day 2: How do fossils form?
Now that students understand what can fossilize, ask them how it fossilizes. Students can visit *How Fossils Form* on Zoom Dinosaurs (http://www.zoomschool.com/subjects/dinosaurs/dinofossils/Fossilhow.html). Students will need to scroll down the page to get to the relevant text.

Discuss the main points of the process:

* An animal must get buried fairly quickly.
* Why must it be buried quickly? (If it does not it would get eaten by scavengers).
* How might it be buried? (It could be buried by volcano or mudslide).
* Water helps bury the animal in sediment (The burial process is crucial. It is also why many animals do NOT get fossilized. Discuss the probability of these circumstances being just right).
* Soft parts decay.
* Sediment presses down and sand hardens to rock forming a fossil.

Challenge students to draw their own diagrams demonstrating the process of fossilization with whatever animal they like. They should describe things mentioned above. Remind them that water could sweep over an animal and bury it in a flash flood or severe storm, and that entire skeletons rarely form because things get carried away.

After students finish their diagrams, tell them to pretend they are in the shoes of a paleontologist (a person who studies dinosaur fossils). Students can:

* Pretend they work in a museum and they have just finished piecing together a nearly complete T. rex.
* Describe the dinosaur and, based on the fossil find, tell a story about its life.
* Use what we know about living animals to come up with ideas about the T. rex. Back their ideas by what they have found in the fossils.
* Encourage them to be creative. Remind them to use phrases like, *This T. rex may have* or *the fossil evidence suggests*.

Day 3: Uncovering the Facts
This activity will be a guided discovery. Have students return to the T. rex page on Zoom Dinosaurs (http://www.zoomschool.com/subjects/dinosaurs/dinofossils/). Explain that they will be T. rex fact finders, but that they have to find details that support the facts.

Students will use their imagination to generate ideas based on these facts. This exercise can either be done as a group or individually, once students understand what they are looking for.

As a model, find the first few facts with students and discuss the support. Then further the discussion with ideas. For example, students will find the following in the Anatomy section of the introduction page.

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* **FACT**: T. rex had tiny arms, each with two fingers. Ask students how paleontologists know about T. rex arms.
* **SUPPORT**: By studying the fossil bone structure of the T. rex, paleontologists can see what the different parts of the body looked like.
* **IDEA**: T. rex may have used its short arms to hold prey while biting it. However, this would depend on whether T. rex is a hunter or scavenger. If he were a scavenger, the prey would not be struggling.

The following facts can be found on that same introduction page (http://www.enchantedlearning.com/subjects/dinosaurs/dinos/trex/index.shtml):

* **FACT**: T. rex had a slim, stiff, pointed tail.
* **SUPPORT**: Fossil bones show the tail and its shape. The way bones are structured show that it was stiff.
* **IDEA**: The tail may have been used for balance, allowing for quick turns while running. The tail can be compared to that of living

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As a class or individually, have the students continue going through the T. rex pages looking for facts and support. Many facts with support can be found within the following headings:

* Introduction
* Skeleton
* What T. rex ate
* Hunting, fighting
* Intelligence, Care of Young
* Running
* Disease in T. rex
* T. rex myths
* Extinction

While not necessary to cover every fact, try to discuss a few from each heading. This activity allows students to gain an understanding of the type of information that can be concluded from fossils, as well as discover that not all facts are believed to be 100% accurate.

Questions to discuss:
* What kind of information can scientists find out by studying animal fossils?
* What can the skeletal structure tell? (How an animal moved, how bones fit together)
* How can paleontologists group together certain dinosaurs?
* What sort of current knowledge can help us learn about extinct fossils? (By looking at animals today, we can make comparisons).
* What do your students think is needed for ideas to become facts?

Materials Needed

1. One computer with connection to the Internet; one MakerBot Replicator 2 Desktop 3D Printer.
2. The T-Rex Skull 3D files.
3. Paper, pencils, poster boards, markers.

Duration of Lesson

3-5 Class Periods

Rubric and Assessment

Students can use information from the lesson to construct a T. rex trading cards. This model can be designed by hand or on a computer. On the front, a picture of the T. rex. On the back, specific facts about the T. rex. Cards should also include explanations for why the facts are believed to be true. Students can then trade these cards, explaining to their peers what facts they deemed important and why.

References

While resources do not have to be limited to the Internet, some good sites include:

http://www.enchantedlearning.com/subjects/dinosaurs/dinos/Trex.shtml
https://www.childrensmuseum.org/educators/classroom-resources
http://www.discovery.com/video-topics/other/dinosaur-videos

Source
http://www.ucmp.berkeley.edu/

Tags

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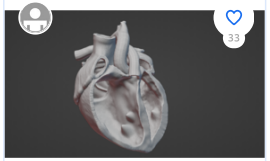
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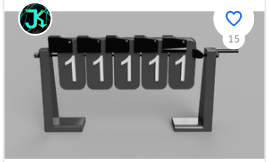
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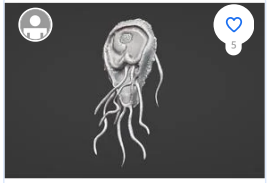
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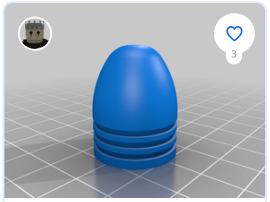
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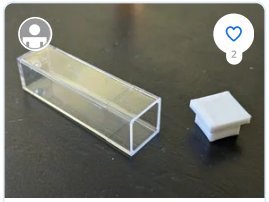
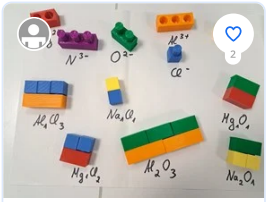

Cuvette Lid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